



Framework Contract EuropeAid Lot 4 Energy and Nuclear Safety  
Request for Services 2010/242372

# **Prefeasibility and feasibility study in support of the design and implementation of the Project: EU- China Near Zero Emission Coal Plant Project**

*Final Report*

*July 2013*



This project is funded  
by the European Union



A project implemented  
by MWH



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Team:

- Prof Jihong Wang (Team Leader/project coordinator)
- Dr Andrew Minchener OBE (CCS expert)
- Chen Langnan (Financial Advisor)
- Prof Guolian Hou (Expert in the power sector)



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## **1. FINAL PROJECT REPORT**

The Interim Advisory Service (IAS) for the NZEC Phase IIA project, provided by MWH, the contractor, started project implementation in June 2010. This present report summarises the service work provided by the IAS team throughout the whole project period.

### **The IAS Team**

The IAS team initially comprised four members:

- 1) Prof Jihong Wang (Team Leader/project coordinator)
- 2) Dr Bill Senior (CCS expert)
- 3) Chen Langnan (Financial Advisor)
- 4) Hong Shi (expert in the power sector)

Due to the project being on hold for a long time, Dr Senior and Mr Hong Shi could no longer make an open ended commitment to the project and became unavailable at the time that the project was resumed. After fruitful discussions with the EC, our client, Dr Senior and Mr Shi were replaced.

The new CCS expert, Dr Andrew Minchener, and the new KE 4, Prof Guolian Hou, were recruited and approved on the team by the European Commission.

The team composition at the end of the service contract period is:

- 1) Prof Jihong Wang (Team Leader/project coordinator)
- 2) Dr Andrew Minchener OBE (CCS expert)
- 3) Chen Langnan (Financial Advisor)
- 4) Guolian Hou (expert in the power sector)

In the period from the start of the project, to date, we have had five Task Managers from our Client, the EC:

- 1) Michel Van-Den-BOSSCHE
- 2) Georgios TSITSOPOULOS
- 3) Anastase ZACHARAS
- 4) Arnaud DE-VANSSAY
- 5) Camelia PARASCHIV

## **2. PROJECT OVERVIEW**

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The kick-off meeting of the project took place in July 2010, at EC HQ in Rue de la Loi, with the Task Manager at that time, Mr Michel Van-Den-Bossche and Mr Antongiulio Marin and the Team Leader Mrs Jihong Wang.

The meeting provided an overview of the NZEC project history and work plan and clarified the role of the IAS team within the project framework. The detailed discussion gave a good overview of the services to be provided by the IAS team.

Throughout the project, the IAS team has followed the project's ToR and provided their support to the project by developing the 5 tasks required as deliverables:



**Task 1 - Assisting the Commission in keeping track of the implementation of Phase IIA:**

During the project period, the IAS team read through and made comments on all the reports, work proposal of Phase IIA, the call for proposal and the relevant documents for the project implementation. Upon request of the Commission, the team participated in management committee pre-meetings, joint EU-Chinese PMU meetings, tele-conferences, and face-to-face project discussion meetings. The team drafted and delivered all the meeting minutes to report back to EC and to MOST in China (see Appendices enclosed). The team leader and the CCS expert have also travelled to China to gain updated information about the project progress on behalf of the EC project delegation and reported back to the Project Manager of the EC to ensure that the project progress information was exchanged in a timely manner.

**Task 2 Following up results of the NDRC CCS Study (ADB)**

The Capacity Building Study is supported by the NDRC and the ADB. The project was designed to improve institutional capacity at Huaneng Power to implement CCS on the 250MWe IGCC in Tianjin.

During the project period, there were no reports of the named study received from either EC or China or ADB. The IAS team could not therefore review any progress, if any, and could not form any conclusions or recommendations.

The information accessed by the IAS team is from public accessible media source. The project was completed successfully, since when Huaneng and its partners have installed and began operation of the IGCC unit in 2012. The intended CCS project has not yet been implemented due to some delays in operations of the IGCC, for which optimised performance has yet to be achieved.

There were no following meetings in China for the IAS team to take part to.

**Task 3 Serving as counterpart to the China NZEC Permanent Experts Group (PEG) and providing upon request advisory services to the JSC:**

Although it is still not clear for the formulation of the PEG in China, the IAS team has played the role as specified in the ToR. The IAS team has been working closely with EC and the China NZEC team in preparing and finalising the Work Proposal of Phase IIA. A work plan with clearly defined time schedule was provided by the IAS which has been used for monitoring the work progress. The IAS was involved in every step of the implementation of the work proposal.

Some particular issues were brought up by the Steering Committee at the meeting in 2010. It was suggested that, upon request of the Commission, the IAS team would intervene on these topics, make proposals, elaborate on technical options, complete the SoW and convey EU views to the China NZEC Experts Group, namely:

- Clarify the role of the peer reviewer (EIB) and the PMU – The role of PMU and EIB are clearly defined in the work proposal for Phase IIA. EIB and PMU have played their role in reviewing the document of Work Proposal and “Call for Proposal”.
- Exchange views on possible technical aspects – Along the project progress, the IAS team has provided their support and instrumented the exchange views on technical aspects about the work proposal and the call for proposal documents between EC, the relevant parties and the MOST.

However, due to the project schedule delays, the pause and changes - all outside the control of the consultant - the project has not progressed to Phase IIB. Hence, the IAS team could not provide service for the following matters.

- Procurement rules for Phase IIB
- Financial considerations based on contribution of MS funds for Phase IIB and Phase III: distinct Member States rules may apply for specific components financed by them
- Management structure for Phase IIB and III, taking in consideration the involvement of Chinese promoters and sponsors as well as potential industrial partners from both sides



#### **Task 4 Participating in Steering Committees, EU-NZEC Management Group meetings and consultation meetings with EC services:**

The IAS team provided their advice in preparing all the meeting agendas to ensure all the important matters/ items to be discussed at the meetings.

All the meeting notes and minutes were prepared by the IAS team and reported back to the PMU and JSC. With the permission from EC, the IAS team participated in the meeting discussions and provided the technical comments and advice.

#### **Task 5 Finalisation of ToR for 2 services contracts for Phase IIB**

Following a meeting at EC premises in Brussels, IAS team was instructed to drop Task 5, as this has been undertaken and completed, thus becoming redundant for the IAS team.

### **3. SUMMARY OF THE WORK COMPLETED**

- i) Initial comments on “CHINA-EU WORK PROPOSAL ON NZEC **PHASE IIA**” were made in the period of September - October 2010 when MOST sent the first draft of the work proposal of Phase IIA to EC. The team worked on the proposal and provided their technical comments and advice. The comments were sent to EC for approval and then the proposal with IAS comment was sent to MOST, which led to a face to face meeting between EC and MOST in Nov. 2010. The documents are attached to this report as Annex 1 and Annex 2.
- ii) The IAS team provided support in preparing the presentation slides for the European Commission to present the NZEC project at the China 2010 International Forum on Coal Industry. The presentation slides were prepared both in English and Chinese, which has formed an important part of promoting NZEC project.
- iii) In November 2010, the IAS team provided support for the JSC meeting in Beijing. The services included preparing the meeting agenda and the minutes, helping answer technical questions during the meeting, and explaining the technical comments made during the meeting. The meeting agenda and minutes are attached to the report as Annex 3.
- iv) There then followed a one year pause of the project, due to the need to resolve some contractual issues between the Chinese and European partners. The project resumed in March 2012. The Team Leader had a second meeting at EC offices in Brussels during April 2012. The objectives comprised the need:
  - to gain an updated picture of the progress between EU and MOST after the meeting held in Nov 2010;
  - to check whether all the outstanding issues arising from “China-EU Work Proposal on NZEC Phase IIA”, which are recorded in the meeting minutes;
  - to confirm the substitution for IAS member, Bill Senior;
  - to discuss the working plan for the next stage; and
  - to confirm the funding source for the project.
- v) In May 2012, the Team Leader visited MOST in Beijing to gain a clear picture of progress with implementation of the work proposal. The aim of the meeting was to have a face to face meeting with MOST to see if the work had followed the agreed work proposal and any additional support needed. The meeting minutes are attached (Annex 4). As a follow-up action, MOST sent the Chinese EAG meeting notes to EC, which are included as Annex 5.
- vi) Upon request of the Commission, the IAS team was called to attend an EC and MOST joint meeting that was planned to be held in Beijing early 2012. The IAS team made preparation for the trip (vi-



sa, ticket, etc) and meeting agenda and documents to be discussed at the meeting. However, we were informed by EC that the meeting was cancelled 2 days before the trip, which was mainly due to the delays of getting Chinese visa for the delegates from Norway who are the financial support provider to Phase IIA work.

- vii) During July and August 2012, MOST sent the initial draft of the “Call for Proposal” to the EC, which included a proposed list of contributions that they expected from EC. The IAS team provided comments and then worked with the EC to provide replies to MOST. The discussions on comments to the “Call for Proposal” document via email communications continued until January 2013.
- viii) On 23<sup>rd</sup> January 2013, a preparation teleconference was held to finalise the JSC meeting agenda. The Team Leader joined the meeting while the CCS expert was travelling to Brussels for the JSC video conference on 24<sup>th</sup> January 2013. This meeting aimed to finalise the Call for Proposal and was held on 24<sup>th</sup> Jan 2013. The meeting agenda with comments and the meeting minutes with action points are attached to the final report as Annex 6.
- ix) After the JSC meeting, MOST worked on the modifications of the call document with consideration of the comments from the team and the EC. In March 2013, EC received the new version of the call for proposal document and the first version of the application form. After a number of discussions between the IAS team and the EC, via emails and telephone conversations, the final agreed version of “Call for Proposal” was sent to MOST on 11<sup>th</sup> April 2013. This is included as Annex 7.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

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Progress on the project has been difficult right from the start, due to work programme changes, slow correspondence in communication and intermittent periods of project implementation. The project paused for a period of nearly one year before it was resumed during 2012.

The IAS team has been working in a timely manner in response to all the service requests by the EC on this project. The team remained available at all times and at the disposal of the project.

Unfortunately, due to significant delay in the project schedule, which was due to issues outside of MWH's control, the service contract has now expired.

But the project is far from being finalized. There is much valuable work that the team could continue to do to facilitate the smooth operation of this collaborative project; due to contractual issues the EC cannot extend the contract further. Consequently the last activity that has been undertaken by the IAS team is the production of the present final report.

We do strongly recommend that the project be relaunched and activities resumed under a new contract.

The present final report will not show an Executive Summary, due to the fact that the report is short and concise, covering all the aspects required by the ToR, in line with the work undertaken throughout the project by the Team.

The present final report will be translated into Chinese. Annexes to the report will only be presented in English.



## Annex 1 - CHINA-EU WORK PROPOSAL ON NZEC PHASE IIA

### (Annex to Grant Offer Letters)

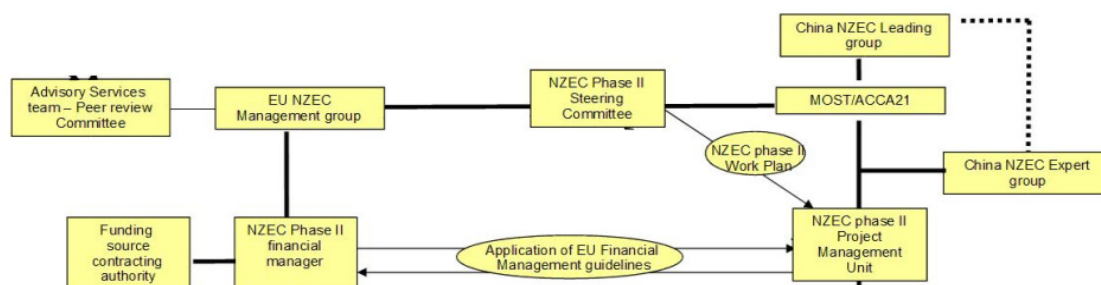
#### 1. Background

China and the EU issued the Joint Declaration on Climate Change which established the bilateral Partnership on Climate Change at the EU-China Summit in Beijing on 5 September 2005. One major objective of this Partnership is the development and demonstration of advanced, “zero emissions” coal technology based on carbon dioxide capture and geological storage. In this respect the EU and China developed the China-EU Near Zero Emission Coal (NZEC) project with the aim of developing and demonstrating carbon dioxide capture and storage (CCS) technology, in EU and China, to capture and storage CO<sub>2</sub> emissions from coal-fired power plants by 2020. The NZEC cooperation has been planned in three phases.

With the successful completion of the China-EU NZEC Phase I (2007-2009), NZEC phase II is founded by a MOU signed between China and the EU on Nov. 30, 2009 at the 12<sup>th</sup> China-EU Summit in Nanjing, China. The Phase II is aiming to strengthen targeted technology cooperation in support of the construction and operation of the demonstration, as well as to build capacity and explore technology transfer, knowledge sharing scheme.

Both sides agreed to breakdown the NZEC Phase II into two sub phases (Phase IIA and Phase IIB) at the last steering committee of Phase I held in Oct. 2009.

At the Joint Steering Committee (JSC) in March 2010 a proposal for the Scope of Work and project management structure of the NZEC phase IIA has been presented by a group of experts (FWC team), and preliminary comments have been received by MOST/ACCA21 in May, in particular regarding the scheme for the project management structure (below an updated version as suggested by MOST/ACCA21). The project management structure can be now finalised and agreed building on this new WP proposal.



#### Objective of Phase II A

The aim of NZEC Phase IIA is to close the gaps between NZEC Phase I, which has developed capacity, assessed options for CCS in China and identified some potential theoretical demonstration site options, and Phase IIB, which will assess the feasibility of a limited number of options for a CCS demonstration plant in China.

In response to the MOU signed between EU and China on NZEC Phase II, the work of Phase IIA would:

- Identify most appropriate demonstration option for Phase IIB feasibility study;
- Support research and studies that underpins NZEC Phase IIB and future cooperation;
- Support further capacity building, technology transfer and knowledge sharing activities and mechanisms to better prepare Phase IIB and future cooperation.

As agreed in the MoU we envisage to further build on the results of Phase I. The call process should prioritise bids in storage basins assessed in Phase I [pre-selection of storage options/sites based on work implemented in phase I could be envisaged].

Proposals should provide guarantee that the project will include storage and be safe and environmental sustainable.

In line with the MOU joint Chinese and EU/EEA applications should be prioritized and the feasibility studies should be implemented by European and Chinese companies and experts, with a balanced role for both sides.

#### Timeline



The project would ideally begin as soon as possible with work to identify the appropriate integrated CCS demonstration candidate being undertaken in parallel with the finalisation of the other work objectives for Phase IIa. The Phase IIa would run for approximately 15 months as a whole, while some of the tasks will be completed earlier.

### **Management oversight**

A joint Steering Committee (EU-China NZEC Steering Committee) has been set up by MOST and the EC to lead NZEC PHASE II.

Members are appointed by both sides equally and it has been suggested to have EU/EEA partners gathered in the EU NZEC management group and the Chinese partners in the China NZEC leading group.

Member States of the EU and the European Economic Area (EEA) may be invited to participate in the activities under this initiative, and be admitted to be represented on the steering committee on terms to be set by the two Sides. At the joint Steering Committee in March 2010 UK becomes a full member of the steering committee.

The ToR of the JSC has still to be agreed and endorsed.

The EU-China NZEC Steering Committee will approve the work plan and make decisions on other key issues of the cooperation.

Quarterly project updates and all the “deliverables” of the work packages will be reported to the Steering Committee.

### **Project structure & management**

A Project Management Unit (PMU), or similar supporting arrangements, would be established for the overall project operational management and coordination. The PMU, set up in ACCA21, will directly report to the steering committee and is responsible for the day to day project management of the various elements of the projects, including sub-contracts and finance (in accordance with financial procedures of the financing entities).

Necessary support would be provided by technical experts and administrative staff in the PMU. Furthermore, the PMU would also be responsible for the organization of project meetings and relevant events. EU/EEA expert(s) will be seconded to the PMU to assist in programme coordination, reporting (technical and financial), organising translation and other activities as deemed appropriate.

Project progress reports and main technical reports will be available in both Chinese and English. A quarterly report will be produced which will include a list of reports produced, that indicates which reports are confidential. The EU management group will have access to the list of produced reports and to non-confidential reports. Treatment of confidential information and reports to be agreed within the parties (using written procedures).

### **Chinese Advisory Experts Group**

There would be a small number of Chinese experts identified by PMU to provide technical advices throughout the design and implementation of the Phase IIa. The group should be formulated before the project starts and the group will assist the project management team (PMU) through the whole project period.

### **EU Advisory Experts Group and peer reviewer**

At the joint Steering committee in March 2010 the EIB was accepted as permanent observer in its capacity of peer reviewer on EU's side of NZEC phase II.

A team of experts has been already selected to provide technical advices throughout the design and implementation of the Phase IIa, to the EU NZEC management group.

## **2. Technical Work Programme**

The planned technical work programme consists of six Work Packages (WPs):

**WP0 Project Management/Administration/Coordination**

**WP1 Strategic fit of the demonstration**

**WP2 Call for proposals and identify the demonstration project**

**WP3 Pre-feasibility study of the 3 shortlisted demonstration projects**

**WP4 Research and studies supporting Phase IIb and III**

**WP5 Capacity Building, Knowledge sharing and Technology transfer**



## WP6 Phase II B scope, design and cost

In general, the WPs defined in this proposal are in line with the scope of work of Phase IIA defined by the Framework Contract Team (FWC team), and have been enriched and re-organized according to the nature of tasks and for the convenience of the project management. The table below reflects the relationship between the 6 WPs and the 9 tasks.

**Table 1: Comparison of the proposed WPs with FWC defined tasks**

Work Scope of the Proposal	Work Scope defined by FWC team
<b>WP0.</b> Project Management/Administration	
<b>WP1.</b> Strategic fit of the demonstration	<b>Task 1.</b> Ensure that NZEC fits with China's wider CCS policy
<b>WP2.</b> Call for proposals and identify the Demonstration project	<b>Task 2.</b> Initial portfolio of CCS demonstration projects and options <b>Task 3.</b> Concept and site Selection Criteria <b>Task 5.</b> Expanded, if necessary, portfolio of CCS demonstration projects <b>Task 6.</b> CCS demonstration project selection process
<b>WP3.</b> Pre-feasibility study of 3 potential demonstration projects led by project owners	<b>Task 8.</b> Conceptual design and scoping study for selected demonstration project and options
<b>WP4.</b> Research and studies supporting Phase IIB and III	<b>Task 4.</b> Business Case <b>Task 7.</b> Regulatory framework needs assessment
<b>WP5.</b> Capacity Building, Knowledge sharing and technology transfer	<b>Task 9.</b> Technology cooperation and outreach plan
<b>WP6.</b> Phase II B scope, design and cost	

The WPs and tasks listed in the proposal will be undertaken by Chinese research institutes, industrial partners and experts, and with support of EU/EEA experts. The proposed budget is intended to cover and support the involvement of Chinese partners only. Detailed description of each WP and estimate of budget and person months are further elaborated below:

### **WP0 Project Management/Administration/Coordination (to be carried by PMU)**

- 0.1 Preparation of work-plan
- 0.2 Management of sub-contractors, budget and finance
- 0.3 Tracking progress and deliverables
- 0.4 Reporting and briefing
- 0.5 Organization of project meetings and events
- 0.6 Organizing experts to provide technical advices to the joint Steering Committee and PMU

Work package number	0	Start date or starting event:	Month 1
Work package title	Project Management/Administration/Coordination		
Estimated budget and total person month	60,000 Euro, 24 person*month		
<b>Objectives</b> <ul style="list-style-type: none"><li>▪ to establish an effective project management structure, with quality control mechanism,</li><li>▪ to enable frequent smooth communication between China and EU side, and</li><li>▪ to support the Steering Committee on decision making</li></ul>			
<b>Description of work</b> 0.1 Preparing work-plan for Phase IIA, to be adopted by joint steering committee 0.2 Managing of sub-contractors, in accordance to the work-plan 0.3 Tracking progress and deliverables of each WP 0.4 Reporting and briefing to the joint steering committee 0.5 Organizing project meetings and events 0.6 Organizing experts to provide technical advices to the joint Steering Committee			
<b>Deliverables</b> (brief description) and month of delivery D0.1 Phase IIA work-plan (month 0) D0.2 Progress reports (regularly: 3 months base) D0.3 Organized meetings and events (kick-off meeting, etc.)			



### **WP1 Strategic fit of the demonstration**

- 1.1 Vision for CCS demonstration in China
- 1.2 Consultation of key stakeholders
- 1.3 General guideline for demonstration options

WP1 will improve the outputs of NZEC Phase I on the role of CCS and NZEC demonstration in China, and provide a general guideline for developing the selection criteria for the NZEC demo to make sure the NZEC demonstration plant fit with China's wider vision for CCS development, demonstration and deployment.

Work package number	1	Start date or starting event:	Month 1
Work package title	Strategic fit of the demonstration		
Estimated budget and total person month	60,000 Euro, 24 person*month		
<b>Objectives</b> <ul style="list-style-type: none"><li>▪ To develop the guideline for the NZEC CCS demo plant;</li><li>▪ To analyze of the role and impact of CCS in China.</li></ul>			
<b>Description of work</b> (possibly broken down into tasks) 1.1 I identify the role of CCS demo in China. <ul style="list-style-type: none"><li>▪ Review of the existing CCS policies/projects in China and around the world</li><li>▪ Analyze the role of CCS demo and further deployment in China</li><li>▪ Analyze the impacts and implications of CCS deployment in China</li></ul> 1.2 Key stakeholders consultation on CCS demo in China (2-3 workshops): <ul style="list-style-type: none"><li>▪ Basic requirements for the demo (full Chain, scale, implementation time frame, fuel type, etc.)</li><li>▪ Site preferences (both capture and storage sites)</li><li>▪ Technology preferences</li><li>▪ Storage solutions (prioritization of storage basins)</li><li>▪ Etc.</li></ul> 1.3 General Guideline for CCS demonstration in China <ul style="list-style-type: none"><li>▪ Review existing guideline for CCS demonstration worldwide, especially in EU/EEA</li><li>▪ Formulate guideline for CCS demonstration in China</li></ul>			
<b>Deliverables</b> (brief description) and month of delivery D1.1 2 workshops organized with summary of the outcomes (month 1-2) D1.2 Guideline for CCS demonstration in China, to guide the project selection in WP2 (month 2) D1.3 Report on the role and impact of CCS demonstration and deployment in China (month 6)			

### **WP2 Call for proposals and identify the Demonstration project (review and assess demonstration options, to be carried by PMU)**

- 2.1 Preparation for the call for proposal
- 2.2 Initiate the call for proposals
- 2.3 Review the portfolio of integrated CCS demonstration projects and prepare a shortlist of three options
- 2.4 Develop evaluation criteria for the selection of demonstration project
- 2.5 Review pre-feasibility studies and identify most appropriate candidate for Phase IIb feasibility study

Demonstration options should be considered against a number of selection criteria and in close consultation with a range of key stakeholders, including the consultation conducted in WP1. A "call for proposal" approach will attract interested industry parties to apply for involvement, as well as establishing connections with potential partners of the CCS chain. The PMU and the administrative and technical expert team (Chinese Advisory Experts Group) will be the key to ensure the successful identification of the most appropriate candidate projects.

Work package number	2	Start date or starting event:	Month 3
Work package title	Call for proposals and identify the Demonstration project		
Estimated budget and total person month	80,000 Euro, 30 person*months		
Objectives			



<ul style="list-style-type: none"> <li>▪ To shortlist the 3 demonstration options<sup>1</sup> for pre-feasibility study;</li> <li>▪ To identify the candidate project<sup>2</sup> for Phase II B feasibility study.</li> </ul>
<p><b>Description of work</b> (possibly broken down into tasks)</p> <p>2.1 Preparation for the call for proposal</p> <ul style="list-style-type: none"> <li>▪ Stakeholders mapping and stakeholder engagement, to assess stakeholders' understanding of the NZEC CCS demo, and identify key partners;</li> <li>▪ Develop selection criteria including for storage for short listing demonstration options based on the guideline in WP1, and compose the shortlist options selection form ;</li> <li>▪ Documents preparation for the call for proposal</li> </ul> <p>2.2 Initiate the call for proposals</p> <ul style="list-style-type: none"> <li>▪ Release the call for proposal and Q&amp;A;</li> <li>▪ Collect proposals;</li> <li>▪ Summarize the Portfolio of CCS demonstration options</li> </ul> <p>2.3 Review the portfolio of integrated CCS demonstration options and prepare a shortlist of three for pre-feasibility study</p> <ul style="list-style-type: none"> <li>▪ Organize a panel of experts to review the received proposals according to the criteria;</li> <li>▪ Generate the shortlist of 3 options for pre-feasibility study;</li> <li>▪ Develop detailed requirements for pre-feasibility study.</li> </ul> <p>2.4 Develop evaluation criteria for the demonstration project</p> <ul style="list-style-type: none"> <li>▪ Summarize the basic factors (including general factors for power plant and specific factors for CCS) for CCS demo project evaluation;</li> <li>▪ Develop the evaluation criteria and evaluation form;</li> <li>▪ Regular communication with the owners of the shortlist demo projects;</li> </ul> <p>2.5 Review pre-feasibility studies and identify most appropriate candidate option for Phase IIb feasibility study</p> <ul style="list-style-type: none"> <li>▪ Collect the pre-feasibility study report, including those not financially supported by NZEC;</li> <li>▪ Preliminary review, further clarifications &amp; explanations;</li> <li>▪ Organize a panel of experts to evaluate the options;</li> <li>▪ Candidate NZEC demo project identified for approval by the Steering Committee;</li> </ul>
<p><b>Deliverables</b> (brief description) and month of delivery</p> <p>D2.1 Selection criteria and form for the shortlist options (month 3);</p> <p>D2.2 Call for proposal documentation (month 3);</p> <p>D2.3 Three shortlist options identified (month 5);</p> <p>D2.4 Requirements for pre-feasibility study (month 5);</p> <p>D2.5 Selection criteria and form for candidate evaluation (month 9);</p> <p>D2.6 Identified candidate project for approval by Steering Committee (month 12)</p>

### ***WP3 Pre-feasibility study led by project owners of the shortlist demo options***

Three full-chain CCS pre-feasibility studies conducted by project owners with financial support and technical guidance provided by NZEC cooperation

- 3.1 Techno-economic solution for CO<sub>2</sub> capture from coal fired power plant;
- 3.2 Techno-economic solution for CO<sub>2</sub> transportation and storage;
- 3.3 Full-chain integration
- 3.4 Risk, environment impact and barrier analysis

It will be critical to engage key stakeholders, particularly Chinese power and oil companies, throughout Phase IIa. With the financial support, and technical advices as necessary, Chinese industrial partners will further elaborate the conceptual design of their full-chain CCS demonstration projects. And to the PMU, it should be possible to gain a better understanding of potential partners for Phase IIb.

<sup>1</sup> The CCS project that has been financially supported through international cooperation is eligible for the call for proposal [MOST to clarify].

<sup>2</sup> The CCS project with completed qualified pre-feasibility study report will also be considered, if the project owner of the project is willing to be considered, for evaluation and selection as the NZEC candidate.



Chinese industries and experts should play a key role in this work, drawing on the experiences and expertise available from the EU/EEA as necessary<sup>3</sup>

Work package number	3	Start date or starting event:	Month 6
Work package title	Pre-feasibility study led by project owners of the shortlist demo options		
Estimated budget and total person month	720,000 Euro, 240 person*months (240,000 Euro for each pre-feasibility study)		
<b>Objectives</b> <ul style="list-style-type: none"><li>To complete pre-feasibility studies of three CCS demo options as the candidates for Phase II b.</li></ul>			
<b>Description of work</b> (possibly broken down into tasks) 3.1 Techno-economic solution for CO <sub>2</sub> capture from coal fired power plant; <ul style="list-style-type: none"><li>Definition of general solutions for power plant as the base case(exiting or new built)</li><li>Specific solutions for integrating CO<sub>2</sub> separation into power system</li><li>Estimation of energy penalty and additional cost due to CO<sub>2</sub> capture</li></ul> 3.2 Techno-economic solution for CO <sub>2</sub> transportation and storage; <ul style="list-style-type: none"><li>Assessment of geographical capacity and integrity of storage site</li><li>Investigation of geography of pipeline transportation</li><li>Estimation of investment and operation cost and the potential benefits.</li></ul> 3.3 Full-chain integration issues <ul style="list-style-type: none"><li>The match (capacity, continuity, etc.) between CO<sub>2</sub> source and sink</li><li>Co-location and clustering consideration</li></ul> 3.4 Risk, environment impact and barrier analysis <ul style="list-style-type: none"><li>Address the policy and regulatory barriers and recommend the corresponding solutions</li><li>Identify the financial gap and recommend the financial mechanism</li><li>Assess the environmental impact of the project</li><li>Assess the technical risks (like leaking) and provide the dealing measure.</li></ul> <p>The pre-feasibility study will be conducted by the project owners of the three shortlisted projects. The budget shall cover field test, survey and acquiring of necessary data for the pre-feasibility. The PMU, with support of some key experts, will provide necessary technical guidance to the project owners.</p>			
<b>Deliverables</b> (brief description) and month of delivery D3.1 Workplan for the pre-feasibility study with scope and list of involved institutions and experts (month 6) D3.2 Three pre-feasibility reports for full-chain CCS demo, in which the preliminary technical solution has been identified, including capture, transportation and storage, and the cost estimation for the phases IIb (feasibility studies) and III (construction and operation) has been provided with error range on phase IIbat around 20%. (month 11)			

#### **WP4 Research and studies supporting Phase IIb and III**

- 4.1 Methodology for cost accounting
- 4.2 Financial model options
- 4.3 Legal and regulatory issues
- 4.4 IPR Issues
- 4.5 Risk analysis and management
- 4.6 Public awareness and acceptance

In prior to the construction and operation of a full chain CCS demonstration in China, many issues must be resolved, including the definition of additional cost, the possible financial model, legal and permitting, IPR, and long-term risk management issues, etc. WP4 intend to contribute to the solutions of above mentioned issues, with stakeholder consultation, discussion and in-depth analysis. A wide range of expertise will need to be drawn on, including expertise on project financing, IPR and legal aspects, to advice on these so called “non-technical” issues.

<b>Work package number</b>	<b>4</b>	<b>Start date or starting event:</b>	Month 1
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<sup>3</sup> Additional budget might be necessary for the involvement of EU/EEA expertise.



<b>Work package title</b>	Research and studies supporting Phase IIb and III
<b>Estimated budget and total person month</b>	400,000 Euro, 160 person*months
<b>Objectives</b> <ul style="list-style-type: none"> <li>Develop a methodology for CCS demonstration cost accounting (especially the additional cost)</li> <li>Develop a financial model for CCS demonstration projects.</li> <li>Suggestions on legal issues of the construction and operation of CCS demonstration project</li> <li>Suggestions on IPR issues of the construction and operation of CCS demonstration project</li> <li>Suggestions on risk management system for the construction and operation of CCS demonstration project</li> <li>Build stakeholder/public awareness of CCS and the NZEC demonstration project to gain acceptance of the project]</li> </ul>	
<b>Description of work</b> <p>4.1. Cost accounting method for NZEC CCS demonstration project</p> <ul style="list-style-type: none"> <li>To establish the principle rules to identify CCS additional cost, including construction and operational phase;</li> <li>Review EU/EEA lessons and experiences on the principle rules for additional cost accounting;</li> <li>Define the detailed cost items related to additional cost for CCS demonstration project and develop a methodology for additional cost estimation.</li> </ul> <p>4.2. Financial model options for NZEC CCS demonstration project</p> <ul style="list-style-type: none"> <li>Investigate the availability of different financial sources for potential CCS demonstrations, including consultation of different stakeholders of their willingness to invest;</li> <li>Explore the financial mechanism for additional cost in CCS demonstrations;</li> <li>Establish a financial model for NZEC CCS demonstration project based on consultation with EU/EEA side.</li> </ul> <p>4.3. Legal and regulatory issues for NZEC CCS demonstration project</p> <ul style="list-style-type: none"> <li>Identify the procedure and relevant national and local administrations for the approval and supervision of the CCS project construction and operation;</li> <li>Investigate the legal and regulatory issues concerning the CCS demonstration project, with consultations with relevant stakeholders including government and industries;</li> <li>Identify legal and regulatory gaps for the NZEC CCS demonstration project, and propose policy recommendations for the implementation of the demonstration.</li> </ul> <p>4.4. IPR Issues regarding NZEC CCS demonstration project</p> <ul style="list-style-type: none"> <li>Identify the existing and emerging IPRs around NZEC CCS demonstration project;</li> <li>Suggestions dealing with issues regarding existing and emerging IPRs;</li> <li>Consultations with EU/EEA and make recommendations on establishing IPRs sharing and protecting mechanism on the demonstration.</li> </ul> <p>4.5. Risk analysis and management of NZEC CCS demonstration project</p> <ul style="list-style-type: none"> <li>Identify the risks around CCS demonstration projects construction, operation and closure, including financial and environmental risks;</li> <li>Suggestions on establishing a risk management mechanism for the CCS demonstration project</li> </ul> <p>4.6 Public awareness and acceptance - outreach and communication</p> <ul style="list-style-type: none"> <li>Identify audiences for communication activities such as general public, local community, local environmental groups, non-governmental organisations, etc.</li> <li>Develop communication strategy to increase awareness of CCS (in general)</li> <li>Develop communication strategy to gain acceptance for the demonstration project]</li> </ul> <p>In order to reflect insights of key stakeholders and generate practical recommendations, frequent consultations, with relevant Chinese governmental departments and large enterprises, will be needed.</p>	
<b>Deliverables</b> (brief description) and month of delivery D4.1 Report of principal rules for CCS additional cost identification (month 8) D4.2 Draft list of additional cost items for CCS demo (month 12) and improved list (month 15) D4.3 Draft report on Financial model options for NZEC demo (month 12) and improved final report (month 15) D4.4 Draft report of legal and regulatory issues and suggestions around NZEC demo (month 12) and improved final report (month 15) D4.5 Draft report of IPR issues and suggestions around NZEC demo (month 12) and improved final report (month 15) D4.6 Draft report on risk analysis and management (month 12) and improved final report (month 15) D4.7 Communication strategies for CCS and NZEC Demonstration project (month 15)]	



**WP5 Capacity building, knowledge sharing and technology transfer**

- 5.1 Share EU/EEA experiences and good practices in the fields of CCS policy and regulation, demonstration project design, construction and operation;  
 5.2 Enhance capacity of involved Chinese industrial partners in the fields of CCS technology integration, engineering design, etc. via personnel exchanging and training program;  
 5.3 Explore knowledge and experience sharing mechanism between EU/EEA and China;  
 5.4 Explore transfer mechanisms, in consultation with EU/EEA stakeholders, on key CCS technologies between EU/EEA and China  
 5.5 Explore mechanisms of on-job training along the implementation of the NZEC projects

Work package number	5	Start date or starting event:	Month 1
Work package title	Capacity building, knowledge sharing and technology transfer		
Estimated budget and total person month	250,000 Euro, 40 person*months (budget also include travel, subsistence and miscellaneous costs for organizing relevant activities)		
<b>Objectives</b> <ul style="list-style-type: none"><li>To build capacity for Chinese organizations and experts on CCS;</li><li>To promote CCS knowledge and experiences sharing between EU/EEA and China;</li><li>To promote CCS technology transfer.</li></ul>			
<b>Description of work</b> (possibly broken down into tasks) 5.1 Share EU/EEA experiences and good practices in the fields of CCS policy and regulation, demonstration project design, construction and operation; <ul style="list-style-type: none"><li>Study tour for Policy makers--Visits to CCS related departments of EU/EEA and member states in the fields of CCS policy and regulation, and good experiences to promote CCS demonstration and deployment, including ZEP (2 weeks, 10-12 Chinese officers and experts)</li><li>Study tour for experts--visits to EU/EEA CCS demonstration projects to share the experiences and good practices for project design, construction and operation (2 weeks, 10~12 Chinese experts)</li><li>ToR of the study tours to be agreed in advance with EU/EEA partners and with stakeholders involved.</li><li>Other relevant activities as necessary (workshop on EU/EEA CCS policies and practices).</li></ul> 5.2 Enhance capacity of involved Chinese partners in the fields of CCS technology integration, engineering design, etc. via personnel exchanging and training program; <ul style="list-style-type: none"><li>Training program (1~2 weeks) in China provided by EU/EEA experts on CCS demonstration project design, construction and operation, around 30 Chinese experts is expected to attend for each. Support personnel exchanging program for at least 8 Chinese technicians for at least one month study and training in EU/EEA</li><li>ToR of the trainings to be agreed in advance with EU/EEA partners and with stakeholders involved</li></ul> 5.3 Explore knowledge and experience sharing mechanism between EU/EEA and China; <ul style="list-style-type: none"><li>Share the materials and information regarding the EU/EEA flagship program CCS projects</li><li>Organize joint workshop on relevant CCS topics as necessary</li><li>Explore the effective sharing mechanism on CCS between EU/EEA and China</li></ul> 5.4 Explore transfer mechanism on key CCS technologies between EU/EEA and China <ul style="list-style-type: none"><li>List of key CCS technologies needed by China</li><li>List of key CCS technologies could be transferred from EU/EEA</li><li>Explore transfer mechanisms on CCS technologies</li></ul>			
<b>Deliverables</b> (brief description) and month of delivery D5.1 two study tours (Month 8-12) D5.2 trainings program (Month 7-12) D5.3 Personnel exchange program (Month 6-12) D5.4 Report on CCS knowledge sharing mechanism between EU/EEA and China (Month 15) D5.5 Report on transfer mechanism on key CCS technologies between EU/EEA and China (Month 15).			

**WP6 Define Phase IIb scope, design, and costs<sup>4</sup>**

<sup>4</sup> Costs relating to non-technical issues.



- 6.1 Identify and secure industrial partners for Phase IIb (both Chinese and EU/EEA);  
 6.2 Prepare work plan for Phase IIb;  
 6.3 Phase IIb work streams and costs;

Work package number	6	Start date or starting event:	Month 12
Work package title	Define Phase IIb scope, design and costs		
Estimated budget and total person month	30,000 Euro, 12 person*months		
<b>Objectives</b> <ul style="list-style-type: none"><li>▪ To prepare for Phase IIb and smooth the transition between Phase IIa and IIb .</li></ul>			
<b>Description of work</b> (possibly broken down into tasks) 6.1 Secure the willingness of the industrial partners for the identified candidate to cooperate for Phase IIb 6.2 Prepare work plan of Phase IIb including procurement procedures, management structure, etc. 6.3 Prepare Phase IIb work streams and costs;			
<b>Deliverables</b> (brief description) and month of delivery D6.1 Identified industrial partners for phase IIb (month 14). D6.2 Work plan of Phase IIb (month 15)			

### ***Project Schedule***

**Provisional Gantt Chart from MOST to be inserted here.**



## Annex 2 - NZEC PHASE IIa WORKING SCHEDULE

Responsibility (TBD)			NZEC PHASE IIa WORKING SCHEDULE (draft version 101104)														
Task Leader	Partners Involved	Tasks	Month														
			1 <sup>st</sup> Month	2 <sup>nd</sup> Month	3 <sup>rd</sup> Month	4 <sup>th</sup> Month	5 <sup>th</sup> Month	6 <sup>th</sup> Month	7 <sup>th</sup> Month	8 <sup>th</sup> Month	9 <sup>th</sup> Month	10 <sup>th</sup> Month	11 <sup>th</sup> Month	12 <sup>th</sup> Month	13 <sup>th</sup> Month	14 <sup>th</sup> Month	15 <sup>th</sup> Month
WP1		<b>Strategic fit of the demonstration</b>															
		1.1 Identify the role of CCS demo in China															
		<b>D1.3 Report on the role and impact of CCS demonstration and deployment in China</b>															
		1.2 Key stakeholders consultation on CCS demo in China															
		1.3 General Guideline for CCS demonstration in China															
WP2		<b>D1.2 Guideline for CCS demonstration in China, to guide the project selection in WP2</b>															
		<b>Call for proposals and identify the Demonstration project</b>															
		<b>D2.1 Selection criteria and form for the shortlist options;</b>															
		2.1 Preparation for the call for proposal															
		<b>D2.2 Call for proposal documentation</b>															
		2.2 Initiate the call for proposals															
		2.3 Review the portfolio of integrated CCS demonstration projects and prepare a shortlist of three options															
		<b>D2.3 Three shortlist options identified</b>															
		<b>D2.4 Requirements for pre-feasibility study</b>															
		2.4 Develop evaluation criteria for the selection of demonstration project															
WP3		<b>D2.5 Selection criteria and form for candidate evaluation</b>															
		2.5 Review pre-feasibility studies and identify most appropriate candidate for Phase IIb feasibility study															
		<b>D2.6 Identified candidate project for approval by Steering Committee</b>															
		<b>Pre-feasibility study led by project owners of the shortlist demo options</b>															
		<b>D3.1 Workplan for the pre-feasibility study with scope and list of involved institutions and experts</b>															
WP4		3.1 Techno-economic solution for CO <sub>2</sub> capture from coal fired power plant;															
		3.2 Techno-economic solution for CO <sub>2</sub> transportation and storage;															
		3.3 Full-chain integration															
		3.4 Risk, environment impact and barrier analysis															
		<b>D3.2 Three pre-feasibility reports for full-chain CCS demo</b>															
		<b>Research and studies supporting Phase IIb and III</b>															
		4.1 Cost accounting method for NZEC CCS demonstration project															
		<b>D4.1 Report of principal rules for CCS additional cost identification</b>															
		<b>D4.2 Draft list of additional cost items for CCS demo and improved list</b>															
		4.2 Financial model options for NZEC CCS demonstration project															
WP5		<b>D4.3 Draft report on Financial model options for NZEC demo and improved final report</b>															
		4.3 Legal and regulatory issues for NZEC CCS demonstration project															
		<b>D4.4 Draft report of legal/regulatory issues and suggestions around NZEC demo and improved</b>															
		4.4 IPR Issues regarding NZEC CCS demonstration project															
		<b>D4.5 Draft report of IPR issues and suggestions around NZEC demo and improved final report</b>															
		4.5 Risk analysis and management of NZEC CCS demonstration project															
		<b>D4.6 Draft report on risk analysis and management and improved final report</b>															
		4.6 Public awareness and acceptance															
		<b>D4.7 Draft report on public acceptance and awareness and improved final report</b>															
		<b>Capacity building, knowledge sharing and technology transfer</b>															
WP6		5.1 Share EU/EEA experiences and good practices in the fields of CCS policy and regulation															
		<b>D5.1 Two study tours</b>															
		5.2 Enhance capacity of involved Chinese partners in the fields of CCS technology integration engineering design etc. via personnel exchanging and training program															
		<b>D5.2 Trainings program</b>															
		<b>D5.3 Personnel exchange program</b>															
WP7		5.3 Explore knowledge and experience sharing mechanism between EU/EEA and China;															
		<b>D5.4 Report on CCS knowledge sharing mechanism between EU/EEA and China</b>															
		5.4 Explore transfer mechanism on key CCS technologies between EU/EEA and China															
		<b>D5.5 Report on transfer mechanism on key CCS technologies between EU/EEA and China</b>															
		<b>Phase II B scope, design and cost</b>															
WP8		6.1 Secure the willingness of the industrial partners for the identified candidate to cooperate for Phase IIb															
		<b>D6.1 Identified industrial partners for phase IIb</b>															
		6.2 Prepare work plan of Phase IIb including procurement procedures, management structure, etc															
		<b>D6.2 Work plan of Phase IIb</b>															
		6.3 Prepare Phase IIb work streams and costs;															

NZEC=China-EU Near Zero Emission Coal (NZEC) project; CCS = Carbon Dioxide Capture and Storage; CO<sub>2</sub> = Carbon Dioxide  
Months are counted from the start of the assignment. Duration of activities is indicated in the form of a bar chart.

■ Deliverable ■ in Progress ■ Workshop ■ Study Tour ■ Training activities



### Annex 3 - MINUTES OF THE MEETINGS

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#### WORK PACKAGE PROPOSAL ON NZEC PHASE IIA - Pre-meeting notes

**Date and time:** 6:00pm (Beijing Time), 3<sup>rd</sup> Nov. 2010

**Venue:** Delegation of the European Union, 4<sup>th</sup> Floor, Entrance D, QianKun Da Sha, 6 Sanlitun Xi Liu Jie, Beijing

**Attendees:** Ioannis KAVVADAS (IK), Laurent Javaudin (LJ), Antongiulio MARIN (AM), Bill Senior (BS), Langnan Chen (LNC), Jihong Wang (JW).

**Chair:** Antongiulio MARIN

Welcome from the Chair.

The Chair confirmed the purpose of the pre-meeting: to prepare the discussion issues for the meeting to be held on 4<sup>th</sup> and 5<sup>th</sup> Nov. and to finalise the scope of the work packages of the NZEC Phase IIA.

The Chair outlined the “agendas” for the meetings on 4<sup>th</sup> and 5<sup>th</sup> Nov: 1) to discuss the general comments for the proposed work packages; 2) to go through all the specific comments marked in the proposal documents; 3) to discuss the timelines and others.

A few key issues to be addressed in the meetings:

- 1) to clarify the project management structure and clarify the roles of EU/EAA in the management committee;
- 2) to reach the agreement for the comments marked in the proposal document.

The Chair updated the financial commitments from the UK, Norway and EU. Finance for the project may not be the major issue to be discussed at the meetings on 4<sup>th</sup> and 5<sup>th</sup> Nov.

The Chair clarified the roles of IAS: to provide advisory services to EC only. AM re-clarified the procedures/rules that the IAS needs to follow at the meeting.

Another important question to be asked at the meeting would be who or which government branch could give the permission to build power plant with CCS and storage integration implementation.

Finally, the meeting discussed some questions raised from the members of the IAS.

Closure of the meeting



## WORK PACKAGE PROPOSAL ON NZEC PHASE IIA Meeting Minutes

**Date and time:** 11:00am (Beijing Time), 4th Nov. 2010

**Venue:** Delegation of the European Union, 4<sup>th</sup> Floor, Entrance D, QianKun Da Sha, 6 Sanlitun Xi Liu Jie, Beijing, China

### Attendances and apologies:

#### Attendances:

**EU/EAA:** Ioannis KAVVADAS (IK, EU), Antongiulio MARIN (AM, EU), Bill Senior (BS, IAS), Langnan Chen (LNC, IAS), Jihong Wang (JW, IAS) James Godber (JG, DECC, UK), Kirsten Jacobsen ( KJ, Norwegian Embassy)

#### MOST:

Jiutian Zhang (JTZ, ACCA21), Ying Fan (YF, The Chinese Academic of Sciences), Xiaochun Li (XCL, The Chinese Academic of Sciences), Lin Gao (LG, The Chinese Academic of Sciences), Li Jia (LJ, ACCA21)

**Meeting Chair:** Antongiulio MARIN (AM)

#### Apologies:

Welcome from the Chair

1. **AM** gave a brief introduction to the project background and then outlined the meeting purposes which are:

to discuss all the comments raised for the work-package proposal:

- 1) to finalise all the general comments listed in the October communication cover note;
- 2) to finalise the WORK PACKAGE PROPOSAL ON NZEC PHASE IIA (line by line).

**AM** suggested to start the meeting from the general comments, move onto all the specific comments, and then finalise all the issues concerned.

**JTZ** agreed the proposed agenda and asked to add a third point :

- 3) project financing and financial management

He believes that the project needs to start as soon as possible and the good management structure is very important.

### 2. Introduction of all the members/attendees.

### 3. Discussion on the general Comments raised in October communication cover note.

- The meeting confirmed that the SoW must be consistent with the principles of the MoU and give emphasis on knowledge sharing.
- **AM** addresses that the 15 months time frame is very tight for the project so it is essential to have a good working programme and management structure. China has gained experiences through collaboration projects with other partners so Phase II should be built upon those experiences gained. Opinions on storage sites are one of main concerns.
- **JTZ** pointed out that he does not feel any difficulties for both sides to reach the final agreement for the "proposal" and he made the following comments:
  - The project aim "to design a safe and environmental sustainable CCS demonstration" is the major principle in developing project plan and conducting project work. Technology understanding and technology standard in project selection are very important from the safety and sustainability point of view. **AM** pointed out that one of our major concern is that CO2 is safely and permanently stored underground
  - Joint management entails balanced roles for both sides which have been agreed in MoU. This will be the principle through the whole project (Phase II). In terms of the proposal, he pointed that MOST did not know the detailed information from EU for how the structure of



the financial management should be. At the stage of preparing the proposal, MOST has concentrated on technical SoW, but detail information on financial procedure to apply are necessary to finalise project management structure **AM** refer to EU partners to detail their respective financial procedures

- To complete the whole Phase II work in 2012, it requires both sides to work very closely. MOST has discussed this with Chinese experts for efficient organisation of this project work. Further to Phase I work, MOST is now already working on the technical details of demonstration project selection. From MoU, two years time frame has been specified to finalise feasibility, which is fine for Chinese partner to complete the work within two years. **AM** agreed about need to enhance Chinese ownership
  - Phase II must be based on the results of Phase I but it has some restrictions. Phase I is more on the knowledge development and technology understanding so Phase II work has not been considered very much at the stage of conducting the work of Phase I. In terms of storage, we should not be restricted on findings from Phased I study. **AM** suggested that we consider geological sites where we have at least comparable information as for the one assessed in phase I
  - Discussion on the joint management approach: Phase I had four parallel projects and the management model is fixed. UK has given great contributions to project day to day management. For Phase II, Chinese side will play the major role as agreed previously. **JTZ** made an suggestion: MOST will propose an initial suggestion for the PMU after this meeting and then to have a discussion at the meeting on 5<sup>th</sup> Nov.
- Project starting date: The meeting agreed aiming to start the project in Dec. 2010/January 2010.
  - It was suggested to concentrate on SoW for this meeting and leave the management structure discussion for tomorrow's meeting. Agreed by the meeting.  
Action: MOST will prepare an initial description for the PMU (members and function).
  - The meeting had a discussion on the issues relevant to knowledge sharing and transfer. **AM** stressed that The mechanism for knowledge sharing and transfer must be practical and we must be pragmatic.
  - **AM** mentioned that, in EU, there is a platform of ZEP to bring industries and other stakeholders together for knowledge and information sharing, also to speed up the process the knowledge transfer, and the March visit of MOST to ZEP has been very promising. For NZEC the main vehicle for knowledge sharing would be to have Chinese industry to work with EU industry. Some visits should be arranged to Europe. Norway has solid experience gained from previous projects.
  - **JTZ** reported that China is now in the process of establishing a knowledge sharing "Alliance" similar to ZEP: which will bring industry, research institutes and universities together in the sectors of oil, coal, power, etc. This may facilitate exchange of information and knowledge sharing (expected to be finalised for this alliance by end of this year or beginning of next year.). **AM** stressed that ZEP is an independent organisation and knowledge sharing among parties is implemented on voluntary basis. The EC can not impose decision but will convey the message about Chinese interest for further cooperation

#### 4. Discussion of the comments to the document contents (line by line)

##### Background

- It is suggested to show the management function block diagram separately from the whole project overview block diagram. More detailed management approach should be discussed at the meeting to be held on 5<sup>th</sup> Nov.
- Following request from MOST, UK and Norway could be able to provide more information on financial support/offers so the financial issues can be discussed on 5<sup>th</sup> Meeting at MOST.
- **JG** from DECC confirmed UK's commitment to Phase II. The funding commitment is likely to be made in the form of a "Grant Offer Letter". **JG** will provide some suggested models relating to finance/grant management for the meeting on 5<sup>th</sup> Nov.
- **AM**: MOST and EC are open to get new member states to join the collaboration programme. MOST accepted to have Norway as a member of the JSC through an exchange of letter.

##### Objective of Phase II A

- Agreed

##### Timeline

- Agreed with the objective to start asap



#### **Management oversight**

- This will be a separate segment from SoW to be discussed in details at the meeting on 5<sup>th</sup> Nov.
- Changes to “Quarterly project updates and all the “deliverables” of the work packages will be reported to the Steering Committee.” Agreed.
- The meeting agreed that we should have the following documents in place before Phase IIA starts, 1) SoW; 2) management approach; 3) financial offer letters 4) Provisional Gantt Chart.

#### **Project structure & management**

- The meeting had a good discussion on the reporting procedure and report information accessing, report confidential level, availability in both Chinese and English version, and etc.
- The meeting agreed that the project progress reports and technical reports will be available in both Chinese and English. Accessing the reports produced through the project progress is subject to the confidential level.
- The modified wording for reporting procedure and accessing will be prepared by EU team before the meeting on 5<sup>th</sup> Nov at MOST.

#### **Chinese Advisory Experts Group**

- The meeting agreed with the comments made to the proposal.

#### **EU Advisory Experts Group and peer reviewer**

- No further comments to this part at the meeting.

#### **WP0 Project Management/Administration/Coordination**

- More detailed information is required for PMU, such as how many members and functions and etc. JTZ: to be confirmed at the meeting on 5<sup>th</sup> Nov.
- Comments to D0.2 – agreed by the meeting.

#### **WP1 Strategic fit of the demonstration**

All the comments are approved at the meeting.

#### **WP2 Call for proposals and identify the Demonstration project (review and assess demonstration options, to be carried by PMU)**

- [WP 2: Timing for Proposals and Short listing, i.e. D2.2/D2.3 are in the critical path, especially, D2.3 will be completed before D1.3. D2.4 should be better defined. Industry participation is essential in these] – accepted.
- JTZ reported a Gantt chart is in preparation and will be discussed tomorrow.
- The meeting agreed to move the management related paragraphs to the Background section.
- All the footnotes are clarified at the meeting.
- IK asked where the call for proposals will be published. JTZ explained that two channels will be used to instrument the call: 1) open to public; 2) information exchange with particularly potential sectors/industrial partners.

#### **WP3 Pre-feasibility study led by project owners of the shortlist demo options**

- The meeting confirmed that the budget does not allow Lab study and new survey (commented from Xiaochun Li).
- The meeting agreed with the changes made for deliverables D3.2. (20% accuracy for Phase II estimation).

#### **WP4 Research and studies supporting Phase IIb and III**

- EU team proposed to have extra text for stakeholder consultation (public acceptance) as W4.6, and MOST welcomed the proposal

#### **WP5 Capacity building, knowledge sharing and technology transfer**

- The meeting agreed all the changes made from all parties.

#### **WP6 Define Phase IIb scope, design and costs**

- (“non- technical” issues. The cost of the feasibility studies to be defined by the pre-feasibility studies) – will be included as footnotes to the document.



**Fund management**

- This will be discussed separately when UK and Norway have provided more information on grant offer, conditions and management.

**5. Summary**

With all the above recorded actions, EU and MOST will prepare the following for the meeting on 5<sup>th</sup> Nov:

EU: 1) to provide more detailed information about ToR of the expert to be seconded to the PMU;  
2) to co-operate all the comments and changes discussed at the meeting to the proposal document text including the draft for public awareness, and send to MOST before the meeting.  
MOST: 1) Gantt chart; 2) draft ToR of the PMU.

**6. Any other business**

None.



## Annex 4 - MINUTES OF THE MEETINGS

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### CHINA-EU NZEC PHASE IIA - Meeting Minutes

**Date and time:** 10:00AM (Beijing Time), 4th May 2012

**Venue:** MOST, 15 FuXingLu, Beijing, China

#### Attendances and apologies:

#### Attendances:

Longchao ZHOU (LCZ, MOST), Jian QIAO (JQ, MOST), ZHANG Jiutian (JTZ, MOST-ACCA21), Xian Zhang (XZ, MOST-ACCA21) Jihong Wang (JHW, IAS)

**Aim of the meeting:** discussion of the project progress

The meeting started with a brief introduction made by Director Zhou to highlight the NZEC IIA project activities since the cooperation agreement was signed between Norwegian Ministry of Petroleum and Energy (MPE) and Administrative Centre for China's Agenda 21 of the People's Republic of China in Nov 2011. Then the detailed discussion about the project progress followed.

JHW suggested discussing the project progress based on the agreed "China-EU Work Proposal on NZEC PHASE IIA".

- 1) JTZ confirmed that 1<sup>st</sup> Feb 2012 is marked as the formal start date of the project. Before 1<sup>st</sup> Feb, MOST worked on preparation for the project's start including the process of official approval from MOST and bringing the project team together.
- 2) The Project Management Unit (PMU) was formed with seven members led by Dr Jiutian Zhang. The PMU consists of two leading experts plus administrative staff (selected from ACCA21).
- 3) A team of specialists were identified and the Chinese Advisory Experts Group (AEG) is set up. The AEG has a team of 20-30 experts which include key members and support members (providing their services while they are called by the project).
- 4) PMU and AEG are working on WP0, WP1 and WP2 at this stage.
  - A project work-plan for Phase IIA has been finalised which will be provided by JTZ to the EC and will be included with the meeting minutes for circulation.

**Action:** JTZ, to forward the work-plan to JHW via email within two days after the meeting.

- The current work (WP1) of studies /preparations focuses on: vision of CCS demonstration in China; consultation of key stakeholders, and general guideline for demonstration options. MOST believes this stage of strategic fit study is a key stage for successful completion of the whole project so the NZEC team is now putting the main effort on it. The work covers study of the factors need to be considered in the call, including technology options for future directions (post-combustion CCS, pre-combustion CCS and Oxy fuel), guidelines, suitable scales, technical specifications, consideration of environment impact, long term monitoring, etc.
- A number of meetings were organised with the AEG and the short summary of the outcomes will be forwarded to JHW to be included into the minutes.

**Action:** JTZ, to send a short summary to JHW via email within two days after the meeting.

- The NZEC Phase IIA team is working on preparation of documentation for "Call for Proposal". The provisional version of the documentation should be ready soon (JTZ reported that the draft of the call will be ready by end of May 2012) before the first JSC meeting. The Call will be discussed and agreed at the JSC meeting.
- MOST will host the first JSC meeting in Beijing. MOST asked European Commission to finalise the meeting date and the list of the names of the delegations.

**Action:** Antongiulio MARIN/ Anastase ZACHARAS

- The meeting confirmed that MOST will prepare the agenda for the first JSC meeting in Beijing.

**Action:** JTZ/NZEC team, to prepare the JSC meeting agenda, date for circulating the agenda to be confirmed.

#### 5). AOB

- It is known that there are several CCS projects completed or on-going in Europe. MOST wishes to learn from those projects and to share the project experiences. MOST believes



that the NZEC project will benefit from those projects and the European experience will help successful implementation of the NEZC project.

Director Zhou asked whether there is a formal procedure for knowledge transfer and information sharing; and he also suggested that a formal procedure and channel should be established for this.

**Action:** JHW, to minute the request and report this to Antongiulio MARIN/ Anastase ZACHARAS, EC in Brussels.

- Comments from Director Zhou: Zhou would appreciate if all the elements agreed in the MOST/EC Agreement signed in 2009 will be discussed by JSC and be implemented accordingly in the future. The prefeasibility in elaboration is only one of those elements. Many other issues, such as technology cooperation, information sharing, knowledge transfer, of same importance, must be covered in parallel and need working plans.

**Action:** to be included into the JSC meeting agenda

- Maria Chiara Femiano from the EU Delegation in Beijing and Kirsten Jacobsen from the Royal Norwegian Embassy arrived at the MOST for attending the meeting. Unfortunately, they were stopped by the reception due to the delayed communication.

The EU Delegation informed Director Zhou for their attendance via an email. However, Director Zhou was on his trip to Europe and was unable to check his emails. To avoid any communication delays in the future, all the correspondences to Zhou need to be copied to the Project Officer Jian QIAO. His contact details are: tel: 0086 10 58881353, email: [qiao@most.cn](mailto:qiao@most.cn).

Further comments from Zhou emphasis that "Only CONFIRMED meetings can take place in appropriate conditions". More coordination is absolutely necessary in meeting requests "to ensure our EC friends our constant hospitality".

End of the meeting.



## **Annex 5 - SUMMARY OF AEG (ADVISORY EXPERT GROUP) MEETINGS**

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### **CHINA-EU NZEC PHASE IIA Summary of AEG (Advisory Expert Group) Meetings**

As described in the work plan for the project of NZEC Phase IIA, a number of Chinese experts were identified by the PMU (Project Management Unit) to provide technical advices to the Joint Steering Committee and PMU throughout the design and implementation of the Phase IIA work plan. This AEG consists of between 20-30 experts who have different research background. Five meetings were organised with the AEG in which two were organised after the cooperation agreement was signed between Norwegian Ministry of Petroleum and Energy (MPE) and Administrative Centre for China's Agenda 21 of the People's Republic of China in Nov 2011. The brief summary of the outcomes of the meetings has been listed as follows.

#### **Meeting one**

On 13 May 2010, Beijing, 26 experts attended the meeting. The meeting mainly focused on the vision for the demonstration and development of CCUS in China. The main outcomes are summarized as follows:

- The vision for demonstration and development of CCUS in China has been achieved: provide technically viable and financially affordable technological options to combat climate change and facilitated the socio-economic sustainability.
- Economics and safety of CCS are critical, not only for the demonstration, but also for the further development and deployment of CCS technology in future;
- EU shall make clear commitment on providing sufficient funding to cover all the additional costs for constructing and operating the China-EU NZEC CCS Demo project, and to ensure the stability and accountability of the funding sources, these are the key factor to facilitate a successful NZEC cooperation;
- The purpose of the China-EU NZEC cooperation is not the Demo only, more importantly to strengthen S&T cooperation and technology transfer, to enhance technical and engineering capacity of China in the area of CCS.

#### **Meeting Two**

On 16 May, 2011 Beijing, 16 experts attended the meeting.

The aim of this meeting is to consult key stakeholders about basic conditions for CCUS demonstration in China. This small scale meeting brings a diverse group of stakeholders and experts in CCUS research area from government department, industry, and scientific institutes. Main suggestions are listed below:

- China has many large scaled point emission sources suitable for CO<sub>2</sub> capture, which mainly distribute in electricity, cement, steel, chemical industries, etc., it has the potential to reduce technical cost and facilitate deployment by scaling-up and integration.
- China has considerable theoretical storage potential; there are multiple approaches for CO<sub>2</sub> utilization in China
- It is difficult to bear the enormous costs for multiple integrated full-scale CCUS demonstration projects, not to mention the additional energy consumption and costs for scale-up deployment;
- There exists a matching dislocation between source and sink, the imbalanced development between regions causes that emission sources are more concentrated in the densely populated eastern region, however, the western region is more potential for storage;
- The geologic conditions are complex in China, resulting in more technical difficulties in CO<sub>2</sub> storage. In China, the geologic formations for CO<sub>2</sub> storage are mostly continental deposits, the geologic formation is complicated, with stronger lithologic heterogeneity and lower permeability, featuring small average thickness and high fault density, therefore, the storage technology will be required higher
- The dense population will also require higher security standard for transport and storage in China.

#### **Meeting Three**

On 17 , November 2011 Beijing, 31 experts gathered together for this meeting.

The purpose of this workshop is to develop primary strategy for CCUS demonstration in China. Experts have achieved the following agreements:

- China's actual CO<sub>2</sub> storage capacity is about hundreds of billion tons. Relatively suitable areas for demonstrating CCUS by each type of storage were identified, including China's onshore saline aquifer



fer, seabed saline aquifer, oil-gas reservoir and their relations with the spatial distribution and the matching of intensive emission resources of CO<sub>2</sub>.

- Among many basins in China, Ordos Basin, Junggar Basin, Songliao Basin, Bohai Bay Basin, Sichuan Basin, Tarim Basin and Qaidam Basin have better geological conditions for storage and many types of emission sources, which are priority regions for full-chain CCUS demonstration.
- At present, CO<sub>2</sub> emission sources are concentrated in eastern and central China. Taking source-sink matching into consideration, the basins in these areas have higher potential for implementing full-chain demonstration than western basins.

#### **Meeting Four**

On 13, December 2011 Beijing, 32 experts attended.

This workshop focuses on the selection of technology portfolio of CCUS demonstration. The main outcomes are shown as following:

- Experts suggested 10 kinds of technology portfolios for full-chain CCUS demonstrations
- Workshop also collected various recommendations on demonstration scales at different time node in a full-chain CCUS technology portfolio.
- Carry out a nationwide and systematic assessment of CO<sub>2</sub> utilization and storage potentials at the earliest convenience.
- In the sake of low capture cost, CCUS full-chain demonstration should be firstly applied to emission sources such as coal chemical industry with high concentrations, and large-scale full-chain demonstration should be applied to power plants with large emissions and multi-point sources. But currently, it is difficult to determine the large-scale commercial prospects of post-combustion capture, pre-combustion capture and oxy-combustion capture, and therefore should be put on an equal footing.
- CO<sub>2</sub>-EOR technology is highly proven and has been accomplished with lots of industrial demonstration projects. Onshore saline aquifer has huge potential and is under technological demonstration phase. It is recommended to make a prior deployment of a full-chain technology demonstration of CO<sub>2</sub>-EOR and onshore saline aquifer storage.

#### **Meeting Five**

On 11 March, 2012 Beijing 22 experts attended.

A comprehensive discussion with experts was carried out and the meeting aims to clarify the factors and issues need to be considered and addressed in the call for proposal.

- The meeting went through the achievements of previous conferences and meetings.
- The experts highlighted that the environment impact of CCUS demonstration should be further considered and long-term monitoring for storage must be taken into consideration.
- Some experts also suggested that policy research and development should be conducted. At the moment, there is no national standard in place or there is no standard approach/guidelines for environmental impact assessment for such type of projects.



## Annex 6 - STEERING COMMITTEE MEETING NOTES

### NZEC – Steering Committee

24 Jan. 2013, 16.00-17.30 (Beijing Time)

Venue: No. 2 meeting room, Beijing Xinyuan Hotel.

#### AGENDA

		Lead	Start time	Finish time
1	Opening		16.00	
	Director of the European Division, Mr. Zhou Longchao	MOST	16.00	16.10
	Head of Unit Mr. Peter Wehrheim			
	The meeting on 23 <sup>rd</sup> suggest to update recent development and demo projects both in Europe and China	EU	16.10	16.20
2	Introduction of NZEC IIA: background and progress			
	Review of six packages of NZEC Ila	ACCA21	16:20	
	Budget adjustment and participants proposal on NZEC Phase Ila			
	Discussion			16.40
3	Discussion on call for proposal			
	Presentation: Introduction on revised call for proposal	MOST	16.40	
	Feedback from EU			
	Endorsement of decision points			
	JSC would like to know the PMU structure and members for future communications (based on the agreed work plan)	EU Discussion		17.00
4	Technical and financial support for NZEC phase IIb, III	(MOST/EU)	17.00	17.15
5	Next steps / decisions			
	Draft minutes	Discussion	17:15	
	Endorsement of decision points	Discussion/decisions		17:30
6	AOB and Close of meeting			
	Suggested to have the next JSC meeting on 2 <sup>nd</sup> June 2013			

#### List of participants:

##### 1. CHINA:

##### 1.1 MOST

- Zhou Longchao (Director of the European Division in Department of International Cooperation, MOST)
- Kang Xiangwu (Division Director of the Department of Social Development, MOST)
- Qiao Jian, (Project Officer of the European Division in department of International Cooperation, MOST)

##### 1.2 ACCA21

- Peng Sizhen (Deputy Director General of ACCA21)
- Zhang Jiutian (Deputy Director of global environmental division in ACCA21)
- Zhang Xian (Project Officer, ACCA21)

##### 1.3 Advisory service experts:

- Li Xiaochun (Professor)
- Jin Hongguang (Professor)
- Gao Lin (Professor)

##### 2. EUROPE

##### 2.1 Brussels (or via connection to Brussels):

##### 2.1.1. EU Commission

##### DG CLIMA

- Peter WEHRHEIM (Head of the Climate Finance and Deforestation Unit)
- Antongiulio MARIN (Policy officer)



- Martin KASPAR (Policy officer)  
DG DEVCO
- Arnaud DE VANSSAY (Project officer)

DG RTD

- Vassilios KOUGIONAS (DG RTD)

#### **2.1.2. Norway**

- Tone SKOGEN (Deputy Director General, Ministry of Petroleum and Energy)

#### **2.1.3. European Investment Bank**

- Jean-Jacques SOULACROUP (Senior loan officer and EIB representative in Beijing)

#### **2.1.4. Advisory service experts:**

- Andrew MINCHENER

### **2.2. Beijing (from MOST premises)**

#### **2.2.1. EU Delegation**

- Ioannis KAVVADAS (HoS Cooperation) - tbc
- Maria Chiara FEMIANO (Project officer) - tbc
- Melis KILIC (Intern)

#### **2.2.2. Norwegian Embassy**

- Tor Skudal (Environment Counsellor)



## **NZEC JOINT STEERING COMMITTEE 24 JANUARY 2013 ISSUES AND ACTIONS ARISING**

### **Participants:**

#### **1. CHINA:**

**MOST:** Zhou Longchao (Director of the European Division in Department of International Cooperation, MOST), Kang Xiangwu (Deputy Division Director of the Department of Social Development, MOST), Qiao Jian, (Project Officer of the European Division in Department of International Cooperation, MOST)

**ACCA21:** Peng Sizhen (Deputy Director General of ACCA21), Zhang Jiutian (Deputy Director of Global Environmental Division in ACCA21), Zhang Xian (Project Officer, ACCA21)

**Advisory service experts:** Li Xiaochun (Professor), Jin Hongguang (Professor), Gao Lin (Professor)

#### **2. EUROPE**

**European Commission:** DG CLIMA: Peter WEHRHEIM (Head of the Climate Finance and Deforestation Unit), Antongiulio MARIN (Policy officer), Arnaud DE VANSSAY (Project officer), DG RTD: Vassilios KOUGIONAS (DG RTD), Heidi Hiltunen (EU Del. Environment Counsellor), Ioannis KAVVADAS (EU Del. HoS Cooperation)

**Norway:** Tone SKOGEN (Deputy Director General, Ministry of Petroleum and Energy), Tor Skudal (Environment Counsellor)

**European Investment Bank:** Jean-Jacques SOULACROUP (Senior loan officer and EIB representative in Beijing)

**Advisory service experts:** Andrew MINCHENER

### **Agenda Item 2 Introduction of NZEC 2A: background and progress**

MOST/ACCA 21 wishes to adjust the budget allocation for the Phase 2A programme, by reducing the funding allocated to WPs 1-2 and 4-6 while increasing the amount for WP3 (the prefeasibility studies) to 50% of the total. MOST/ACCA 21 stressed that all the work would still be completed to a satisfactory standard and the overall budget limit would not be changed.

**ACTION:** MOST/ACCA 21 will email the EC to confirm the proposed changes, which are subject to confirmation by the EU side.

China advised that the PMU is now established and comprises representatives from MOST/ACCA 21 supported by their various experts.

**ACTION:** Both sides will formally advise points of contact for the implementation of the Phase 2A programme, covering both technical and administrative issues. For the Chinese side, there will be a single point of contact for all aspects, this being the head of the PMU.

For the Commission side, the main contact point will be Mr. Antongiulio Marin ([Antongiulio.marin@ec.europa.eu](mailto:Antongiulio.marin@ec.europa.eu)) with copy Mr. Ioannis Kavvadas and Ms. Heidi Hiltunen in the EU Delegation ([Ioannis.kavvadas@ec.europa.eu](mailto:Ioannis.kavvadas@ec.europa.eu), [Heidi.hiltunen@eeas.europa.eu](mailto:Heidi.hiltunen@eeas.europa.eu)) and Mr. Arnaud De Vanssay ([Arnaud.DeVanssay@ec.europa.eu](mailto:Arnaud.DeVanssay@ec.europa.eu)). For the Norwegian side, the main contact point will be Mr. Stig Svenningsen (email: [stig.svenningsen@oed.dep.no](mailto:stig.svenningsen@oed.dep.no)) with copy to Ms. Tone Skogen (email [tone.skogen@oed.dep.no](mailto:tone.skogen@oed.dep.no)) and the Norwegian embassy in Beijing (Messrs. [per.bardalen.wiggen@mfa.no](mailto:per.bardalen.wiggen@mfa.no) with copy [Tor.Skudal@mfa.no](mailto:Tor.Skudal@mfa.no)).

### **Agenda Item 3 Discussion on call for proposals**

The intended approach is to initiate the call for proposals and the implement the selection method in order to choose 3 candidates who will each receive funding to undertake a pre-feasibility study. These will be evaluated by the PMU. A winner will be chosen and that consortium will receive funding to complete the pre-project exploration, feasibility study and engineering design (Phase 2B).

While both sides agree on the intended approach, there are issues where further discussion is required before agreement to proceed can be reached.

MOST/ACCA21 would wish to set the minimum annual CO<sub>2</sub> emissions capture level at 300,000 tonnes irrespective of the actual CO<sub>2</sub> capture rate, while, the EU side regard a 85% CO<sub>2</sub> capture rate as a benchmark (already available Best Available Technology) for judging the suitability of any CCS project to be funded within the Phase 2 A programme.

**ACTION:** The EU side will suggest some wording to be included within the call for proposals and continue dialogue with the Chinese side to reach an agreement on how to proceed.

Both sides agreed that Chinese-EU consortia would be welcomed, in keeping with the spirit of the MOU and this point should be reflected in the wording of the call.

**ACTION:** EU side agreed to suggest a form of words to be included within the call.

MOST/ACCA21 agreed with EU proposal to include in the timetable a phase for review of the call document, once finalised, by the EIB and the EU experts. Moreover MOST/ACCA21 agreed with EU proposal to use English as the language for the call, in order to facilitate EU enterprises' involvement.



The proposed timeline is as follows;

- Once the Chinese side has completed the call document, taking into account the issues raised, they will send it to the EU side for comment.
- The EU side will provide any comments within 3 weeks of receipt
- The Chinese side will address any points made then issue the call which will be open for at least 7 weeks (maximum of 9).
- The PMU will then evaluate the proposals received and select the three consortia to receive funding for the pre-feasibility studies.

#### **Agenda Item 4 Technical and financial support for NZEC Phase 2B and the Phase 3**

For the EU side, the EC advised that their pledge of 7m euros and Norways pledge of 60m kroner (~8 m euros)<sup>5</sup> remain firm but the EC also indicated that for administrative reasons to allocate that money to Phase 2 B by the end of 2013 substantial progress would be needed in project implementation. This will be before the end of Phase 2 A and consequently will be prior to a definitive estimate of the cost for 2B.

**ACTION:** The EU side has requested that the Chinese side determine if they might provide balancing funding in the event that there is a shortfall between their commitment and the estimated cost for Phase 2B.

**ACTION:** The Chinese side has requested that the EU side provide a form of words regarding their commitment as part of the introduction for the Phase 2 A call.

Both sides will discuss the Phase 2 B programme at the next Joint Steering Committee meeting

#### **Agenda Item 5 Next steps**

The Norway-China agreement expires at the end of June but it can be extended, subject to both sides having a final review meeting before that date. This can be combined with the next Joint Steering Committee meeting, the Commission would be pleased to host in Europe.

**ACTION:** the Chinese side will propose possible dates in June for these meetings, for consideration by the EU side.

Agenda		Lead	Start time	Finish time
1	Opening Director of the European Division, Mr. Zhou Longchao Head of Unit Mr. Peter Wehrheim	MOST EU	16.00 16.00	16.10
2	Introduction of NZEC IIA: background and progress Review of six packages of NZEC Ila Budget adjustment and participants proposal on NZEC Phase Ila Discussion	ACCA21	16:10	16.30
3	Discussion on call for proposal Presentation: Introduction on revised call for proposal Feedback from EU Endorsement of decision points	MOST EU Discussion	16.30	17.00
4	Technical and financial support for NZEC phase IIb, III	(MOST/EU)	17.00	17.15
5	Next steps / decisions Draft minutes Endorsement of decision points	Discussion Discussion/decisions	17:15	17:30
6	Close of meeting			

<sup>5</sup> This number includes the 1.6 million allocated to Phase IIA.



## **Annex 7 - CALL FOR PROPOSAL**

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### **Call for Proposal for the China-EU NZEC Cooperation - Phase IIA**

#### **Background of the Call:**

In accordance with the Memorandum of Understanding (MoU) signed between the Ministry of Science and Technology of China (MOST) and the European Commission, the two sides jointly launched the CCUS (Carbon Capture, Utilisation and Storage)-based Near-Zero Emissions from Coal project (hereinafter referred to as “the China-EU NZEC Project”). The initial phase of the project was implemented from 2006 to 2009, with the focus on near-zero emissions coal fired power generation technologies, and the Phase I work covered energy consumption forecasting, economic assessment of carbon capturing technology, evaluation of CO<sub>2</sub> geological storage potential in some parts of China, as well as knowledge sharing. Following the success of Phase I, both parties agreed to extend the project further to Phase II (NZEC-II), which is organised into two stages, namely NZEC-IIA and NZEC-IIB, with the aim of promoting CCUS full-chain demonstration of coal fired power generation technologies. Phase IIA is to identify three projects from the proposed Chinese domestic programs for pre-feasibility study through an open call for proposals process. After the pre-feasibility study, one of the three projects will be selected to progress to Phase IIB stage. Phase IIB will focus on helping the engaged enterprise to complete the pre-project exploration, feasibility study and engineering design, with financial and technical support for the selected project.

To further promote this project based on the MoU of NZEC Phase II and the agreement on the implementation of Phase IIA, MOST is calling for proposals of pre-feasibility study projects for the China-EU NZEC project.

#### **1. General Principles:**

- The aim of the call is to promote the development of CCUS technology and its application in China, with enhanced technical exchange and cooperation with EU partners;
- This Call is open to all the technology options so no pre-set, pre-defined or preferred technical path for the call has been declared. As coal based CCS technology is still not mature, an important objective of the project is to strengthen the development of a range of technical solutions that can be taken forward to commercial prototype demonstration in the near future;
- Project applicants are encouraged to consider utilization of the captured CO<sub>2</sub> in the proposed project, as means to generate additional revenue and reduce overall costs.

#### **2. Eligibility of applications:**

All proposals must meet the requirement to take forward projects that are compatible with China's overall CCS development strategy. The plans to construct full-chain CCUS technology demonstration in coming years, shall comply with the following criteria:

- The demonstration must include the whole technical chain of CO<sub>2</sub> capture, transportation and storage /utilization;
- The proposed projects must have the storage/utilization level larger than 300,000 tonnes CO<sub>2</sub> per year, and be technically ready for treating 85% CO<sub>2</sub> from the gas stream. Downstream heat recovery to improve the overall process efficiency would be encouraged.
- It's requested that the project shall be ready for implementation within five years, this comprising one year for the pre-feasibility study, two years for detailed feasibility study and engineering design plus two years for construction;
- The project owner must have a long-term operation plan for the plant with the CCUS integration when and after the project is completed;
- Applicants shall make commitment to provide non-IPR data and materials to facilitate project evaluation;
- Applicants must be committed to publish non-IPR information and materials generated during the implementation of the project openly to public;
- Applicants must be the legal persons of enterprises, and joint application is requested for projects involve more than one enterprises. Joint Chinese and EU/EEA applications will be allowed.
- The tenders should provide a document for justifying the funding resources required. Applications should include a preliminary assessment of investment and operation costs and of sources of financing.
- Application should include a commitment to design and implement a programme for public awareness and acceptance and also a research programme to investigate the performance of a storage site with results to be made publicly available.

#### **3. Procedures and timeline:**



The call for proposal will be preceded according to the procedures and schedule laid below:

- The call is open for the period from DDMMYYYY to DDMMYYYY (7-9 weeks).
- Based on the evaluation results of a designated expert panel, MOST will select three identified projects and, upon confirmation by the Joint Steering Committee. These applicants will be invited to carry out the pre-feasibility studies;
- The identified project applicants carry out their pre-feasibility studies in accordance with the technical and financial requirements. The pre-feasibility study should complete by DDMMYYYY from DDMMYYYY;
- Based on the evaluation results of a designated expert panel to the pre-feasibility study projects, the candidate NZEC demonstration project will be identified and invited for NZEC Phase IIB stage.

**4. Assessment:**

Criteria for project selection: all the qualified proposed projects shall be considered and reviewed equally in accordance with the following criteria, with an aim to identify the most promising demonstration projects.

- Rationality of the technical path of the near-zero emissions coal fired power generation technology demonstration project: including system definition, identification of key problems and justification of solutions;
- Maturity of the demonstration project: including readiness of the infrastructure and industrial facilities for project implementation, and availability of the necessary expertise, site and equipment;
- Project complexity: including operational scope, scale of input, financing model and plan, IPR disputes, and operational cost; and
- Project innovativeness: including technological sophistication, energy consumption, and compliance with the Chinese context-bound innovation.

The priority for project identification and financial support will be given to those projects with sound and feasible project implementation conditions to conduct the pre-feasibility study.

- Preparedness: exploration and examination of the storage site, material sampling, and availability of drill hole;
- Maturity: pre-project ground-forging work and the quality and achievement in the work;
- Feasibility: reasonableness and feasibility of the study approach, contents and progress; and budgetary rationality.
- Innovation: leading technology, lower energy consumption, novelty and suitability for implementation in China.

**5. Support for the Identified Projects:**

Based on the proposal and the evaluation results, up to 270,000 Euro will be provided to each of the three identified projects to conduct the pre-feasibility study. The budget shall cover field test, survey and acquiring of necessary data for the pre-feasibility study. The project entity or entities shall make their own financial contribution to this study as necessary.

**6. Application procedures and timeline:**

The applicants are required to fill in the attached "Application Form for the Pre-Feasibility Study of the China-EU NZEC Cooperation Project". The completed form shall be printed out in triplicate with the official seal and submitted to the Administrative Centre for China's Agenda 21 (the project office of the China-EU NZEC). The electronic version of the project proposal shall be submitted to [ccs@acca21.org.cn](mailto:ccs@acca21.org.cn). Any project without online submission shall not be accepted.

Focal points: Zhang Xian and Zhang Jiutian

Tel: 010-58884888、58884896

Fax: 010-58884890

E-mail: [ccs@acca21.org.cn](mailto:ccs@acca21.org.cn)

Address: Room 713, No. 8, YuYuanTan South Road, Haidian District, Beijing, China. Postal Code:

100038



**Appendix:**

Application Form for the Pre-Feasibility Study of the China-EU NZEC Cooperation Project

**Project Number:** \_\_\_\_\_

(To be filled by the administrative staff of the China-EU NZEC Cooperation Project)

**Application Form for the Pre-Feasibility Study of the China-EU NZEC Cooperation Project**

**Project Title:**

**Applicant :**

**Joint Applicants:**

**The Project Office of the China-EU NZEC Cooperation Project**

**Instructions for Applicants**

1. Please read carefully the call for proposal before compiling an application form.
2. Instructions for completing the application form:
  - (1) The application must have an actual plan for implementing a full-chain CCUS demonstration project with consideration of the individual applicant's business needs;
  - (2) Feasibility in economic, technical and other aspects should be taken fully into account and explained clearly in the proposal;
  - (3) The application should give the counterpart conditions associated with the implementation of the project plan; full management plan and measures should be described in details with specific management strategy and procedures; and the proposal must demonstrate the matched enterprise platform conditions ready for implementation and organization of the project.
  - (4) The application should include convincing justifications for budgetary estimates and present sound financing mechanisms;
  - (5) Comprehensive risk analysis with well-developed countermeasures are required;
  - (6) All necessary proof documents and other appendixes need to be provided with the application.
3. Full words description must be given for any abbreviations in no-Chinese language that are used in the application form.
4. This application form shall be submitted in both Chinese and English versions, and printed out with A4 size papers. The Chinese version shall be in Song-dynasty-style typeface, font size 4; the English version in Times New Roman, size 12pt. The title shall be highlighted in bold.
5. The application form shall be in triplicate in both Chinese and English versions, and submitted with approving stamps of the application enterprises; the electronic version shall be submitted simultaneously.



### Information Sheet

Project Title					Project Number	(To be filled by the administrative staff of the China-EU NZEC Cooperation Project)
<b>Information About the Applicant</b>						
Name				Organizational Code		
Ownership Type	<input type="checkbox"/> State-owned Enterprise <input type="checkbox"/> Private Enterprise <input type="checkbox"/> Others					
Postal Address					Postal Code	
Contact Person	Name		Sex		Job Title	
	Office Tel		Mobile Phone			
	E-mail		Fax			
<b>Project Information of the Full-chain CCUS Demonstration Project</b>						
Full-chain CCUS implementation plan	Expected Launch Time	The Year of ____	Expected Completion Time		The Year of ____	
	Project Scale (10,000 tonnes/year)	Capture: ____; Utilization: ____; Storage: ____				
	Project Site					
	Expected Operational Period	From the year of ____ to the year of ____				
	Collaborative Partners (add more rows if needed)	<div></div> <div></div> <div></div>				
<b>Pre-Feasibility Study</b>						
Starting Time				Completion Time		
Study Budget	RMB ____ (10,000 Yuan), including RMB ____ (10,000 Yuan) to apply for financial support.					
Participating Entities (add more rows if needed)						



**Application for the Pre-Feasibility Study of the China-EU NZEC Cooperation Project**  
**Summary**  
**<Project Title>**

The summary shall introduce the envisaged full-chain CCUS project (including the completed and current on-going work, specific objectives of the demonstration project, the system structure of the demonstration project and technical and economic indicators, expected starting year for construction, starting and ending years of the plant operation, budgetary estimate of the total investment and financing plan, readiness for undertaking the project and major risk analysis.)

The summary shall introduce the pre-feasibility study plan of the envisaged full-chain CCUS project (including objectives and expected deliverables of the pre-feasibility study, budget, time schedules, and relevant work of preparation, existing materials, samples and facilities for conducting the pre-feasibility study.)

**Application for the Pre-Feasibility Study of the China-EU NZEC Cooperation Project**  
**Outline**  
**<Project Title>**

- I. The Background of Demonstration Project
  - 1.1 The Description of Demonstration Project
  - 1.2 Information about the Applicant
  - 1.3 The fundamental information, fact, evidence, data, pre-work, etc related to or required for the Demonstration Project
  - 1.4. The background, rational and process for formulation of the proposal
- II. Introduction of Pre-feasibility Study
  - 2.1 Project Site Selection (types of emission sources and annual emissions, transportation means and conditions along the transportation lines and the geographic and geological conditions of storage sites, storage methods, social impact, etc.)
  - 2.2 Project Scale and Objectives (please including the scale of capture, transport, utilization and storage (tonnes/year), construction and operation schedules, and expected operational period)
  - 2.3 Technical path for project implementation and economic indicators of the project
  - 2.4 Evaluation of the required investment and cost analysis (budgetary estimate of total investment and financing plan)
- III. Track Record, Social Impact and Preliminary Risk Analysis
  - 3.1 Existing study basis and conditions (materials, samples and facilities)
  - 3.2 Social impact and public acceptance prediction
  - 3.3 Risks and uncertainties evaluation
- IV. Project Plan and Budget
  - 4.1 Project annual plan, tasks and schedules
  - 4.2 Counterpart supports provided by the applicant to the project
  - 4.3 Project budget
- V. Appendixes (statement of the commitment to provide non-IPR data and materials and other proof documentations)